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An Investigation of How Horse Racing Experts Make Poor Decisions

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presenter information

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our research interest

- communications in SNS
- user behavior analysis
- trust and security in SNS

background

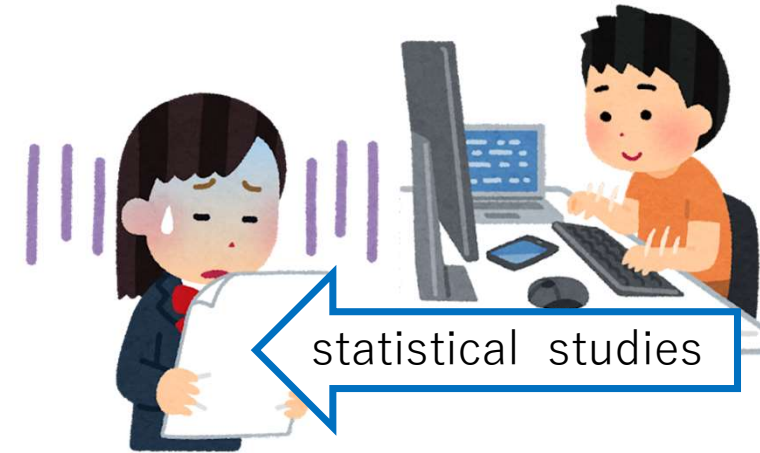
statistical studies showed that even experts made poor decisions



We experts have

- knowledge,
- experience, and
- supporting staff

but, sometimes ...



“fly-ball revolution” [Sawchik 2017]



fly-balls

grounders

○ fly-balls
△ grounders
(from 2017)



statistical research

△ fly-balls
○ grounders
(until 2017)



baseball experts

Which is better:
fly-balls, or grounders?

What we learned

even experts made poor decisions

A new question

how and why
experts made poor decisions ?

A new question

how and why
experts made poor decisions ?

Research target

horse racing experts
(horse owners and trainers)





horse racing experts' purposes

win races and get the prize money

their tactics (race selection)

- select races that are likely to have good outcomes
- not select races that are likely to have poor outcomes

Our reseach purpose

how horse racing experts make poor decisions in race selection



two ways they can make poor decisions:

- they do not select races that are likely to have good outcomes
- they select races that are likely to have poor outcomes

which way? or both ways?

horse racing experts' belief
in selecting races



Many horse racing experts often say

a **sire line** can indicate
the potential abilities of a horse
(e.g. which **distance** races the horse is good at)

sire line: paternal lineage or ancestry of a horse

Our approach

we focus on

- sire line,
- race distance, and
- order of finish

and compare

- experts' race selections
- race results

by using statistical analysis



prize money
in Japan Racing Association (JRA)



Horse owners get prize money
when their horses finish **within fifth place.**





Click here for a list of photos

Birth information Go to data by condition

Data by condition 5th generation pedigree chart

date of birth	March 10, 2015 (Female 9 years old)
coat color	deer hair
trainer	Sakae Kunieda (Miura)
horse owner	Silk Racing Co., Ltd.
Producer/origin	Northern Farm /Abira Town
Central prize money	1,519,563,000 yen
Total results	15 wins, 11 wins [11-2-1-1]
Main wins	19 th Dubai Turf
brother horse	unakite supervia
system	Mr. Prospector type

*Game uniform image provided by: winfinal.com

gathering horse info from Keiba Lab.
(<https://www.keibalab.jp>)

Personal Information:
name, date of birth, sex, ..., owner, trainer, ..., **sire line**, ...

almond eye pedigree About systematic colors

Road Kankoa <small>(Mr. Prospector series) Major winners in 2008 - 13th Sprinter S.</small>	King Kamehameha <small>(Mr. Prospector series)</small>	Kingmambo
	Lady Blaseom <small>(Storm Bird series)</small>	Mantaa
	Sunday Silence <small>(Sunday Silence)</small>	Storm Cat
	Lotta Ioca <small>(Nureyev series)</small>	Saratoga
Fusaichi Pandora <small>(Sunday Silence type) Major winners in 2003 - 06th Elizabeth Cup</small>		Halo
		Wishing Well
		Nureyev
		Sex Appeal

ancestors up to three generations ago

Almond Eye race results

year month day	place	course	weather	Baba	race	Popularity	With jockey	Weight	Number of animals	Frame number	horse number	time	difference in delivery	pace	Inbound B	horse weight	Passing order	Winning horse (2nd place)
2020/11/29	5th	Tokyo Shiba 2400	cloudy	good	Japan C (G)	1	1	Lemaire	55.0	15	2	2:22.0	0.2	35.3 - 37.8(H)	34.7	490(0)	Four Five Four Four	(contrail)
2020/11/01	4th	Tokyo Shiba 2000	cloudy	good	Emperor's Award (Autumn) (G)	1	1	Lemaire	56.0	12	7	1:57.8	0.1	36.5 - 33.6(S)	33.1	490(+2)	3 3 Four	(Fiermann)
2020/06/07	3rd	Tokyo Shiba 1600	Sunny	little	Yasuda Memorial (G)	1	2	Lemaire	56.0	14	Four	1:32.0	0.4	34.2 - 34.3(M)	33.9	488(+2)	11 11	Gran Alegria
2020/05/17	2nd	Tokyo Shiba 1600	Sunny	good	Victoria (G)	1	1	Lemaire	55.0	18	6	1:30.6	0.7	34.2 - 33.9(M)	32.9	486(0)	Four Four	(Sound Chiara)

Race results:
Venue, date, race name, ..., **distance**, ..., **order of finish**, ...

our obtained data of
racehorses

36869 horses
registered with JRA
from 2010 to 2017

Year	# of horses
2010	4470
2011	4524
2012	4505
2013	4595
2014	4649
2015	4663
2016	4370
2017	4733
Total	36869

of horses classified into three famous sire lines

sire line	# of horses
Native Dancer Line	8777
Nearctic Line	6374
Royal Charger Line	18077
others	3641
Total	36869

(Note) We grouped many kinds of branched sire lines into four kinds above

of times the 36869 horses had competed in

race distance	# of races
1000 -- 1399m	89246
1400 -- 1799m	123163
1800 -- 2199m	120251
2200 -- 2799m	19029
2800m --	7920
Total	359609

of times the 36869 horses of four sire lines had competed in races of various distances

sire line	race distance					Total
	1000 -- 1399m	1400 -- 1799m	1800 -- 2199m	2200 -- 2799m	2800m --	
Native Dancer	24264	28895	25762	3474	1767	84162
Nearctic	17228	20917	18728	2589	1240	60702
Royal Charger	38426	62123	65782	11294	4252	181877
others	9328	11228	9979	1672	661	32868
Total	89246	123163	120251	19029	7920	359609

of times the 36869 horses of four sire lines had finished in first place in races of various distances

sire line	race distance					Total
	1000 -- 1399m	1400 -- 1799m	1800 -- 2199m	2200 -- 2799m	2800m --	
Native Dancer	1993	2329	2152	348	215	7037
Nearctic	1377	1598	1478	226	154	4833
Royal Charger	2606	4924	5567	1061	545	14703
others	715	866	675	120	74	2450
Total	6691	9717	9872	1755	988	29023

of times the 36869 horses of four sire lines had finished within fifth place in races of various distances

sire line	race distance					Total
	1000 -- 1399m	1400 -- 1799m	1800 -- 2199m	2200 -- 2799m	2800m --	
Native Dancer	8691	10322	9783	1498	776	31070
Nearctic	6120	7414	6861	989	513	21897
Royal Charger	12878	22677	25338	4603	1926	67422
others	3127	3854	3368	646	262	11257
Total	30816	44267	45350	7736	3477	131646

(Note) horses within fifth place get prize money in the JRA races

statistical analysis of experts' poor decisions

we focus on

sire line, race distance, and order of finish

and compare

- experts' race selections
- race results

by using two-sided binomial test

and detect cases with large differences

two-sided binomial test on experts' selections
by using Hypothesis ES

Hypothesis ES

of times horses were entered
into races of distance d_j

of times horses were entered
into races

×

of times
horses of sire line S_i were
entered into races of distance d_j

probability: an expert enters his/her horse into a race of distance d_j

two-sided binomial test on race results
by using Hypothesis RR

Hypothesis RR

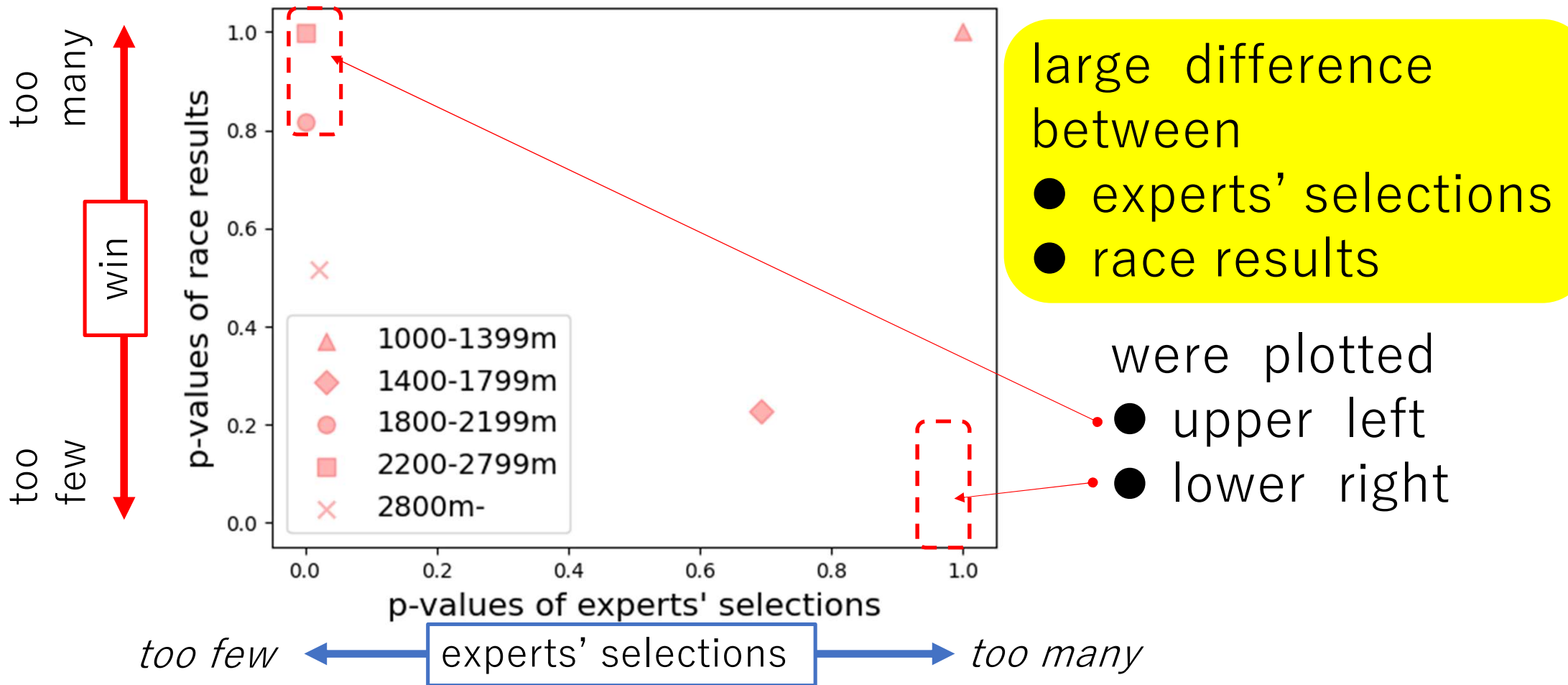
of times horses finished within
 $rank$ -th place in races of distance d_j

of times horses were entered
into races of distance d_j

× # of times
horses of sire line S_i were
entered into races of distance d_j

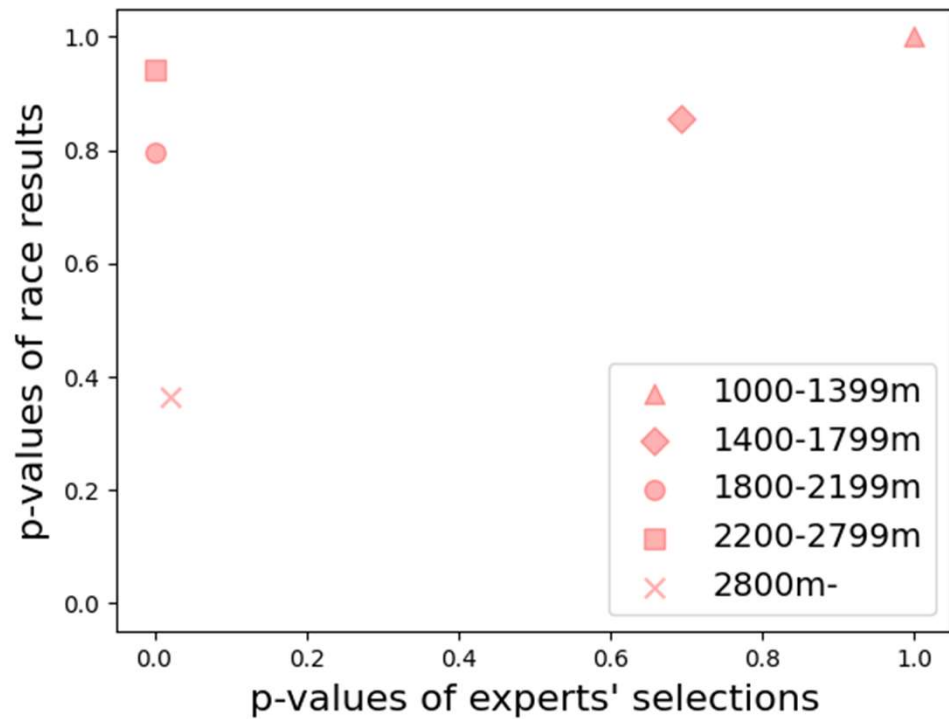
probability: a horse finished within $rank$ -th place into a race of distance d_j

how to read graphs of experts' selections vs race results

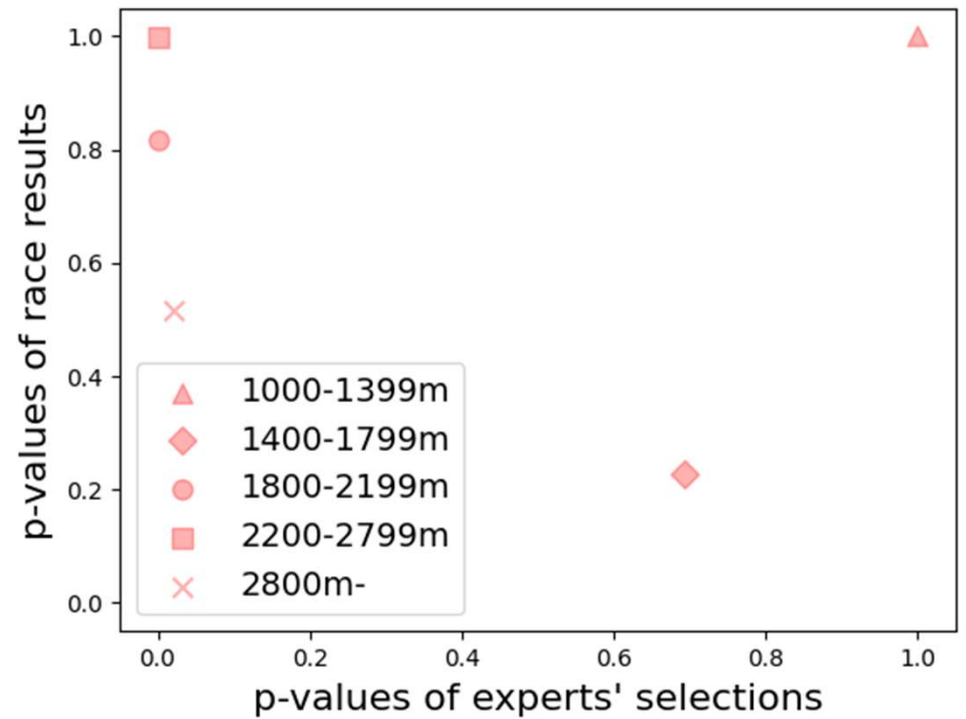


experts' selections vs race results

Native Dancer Line



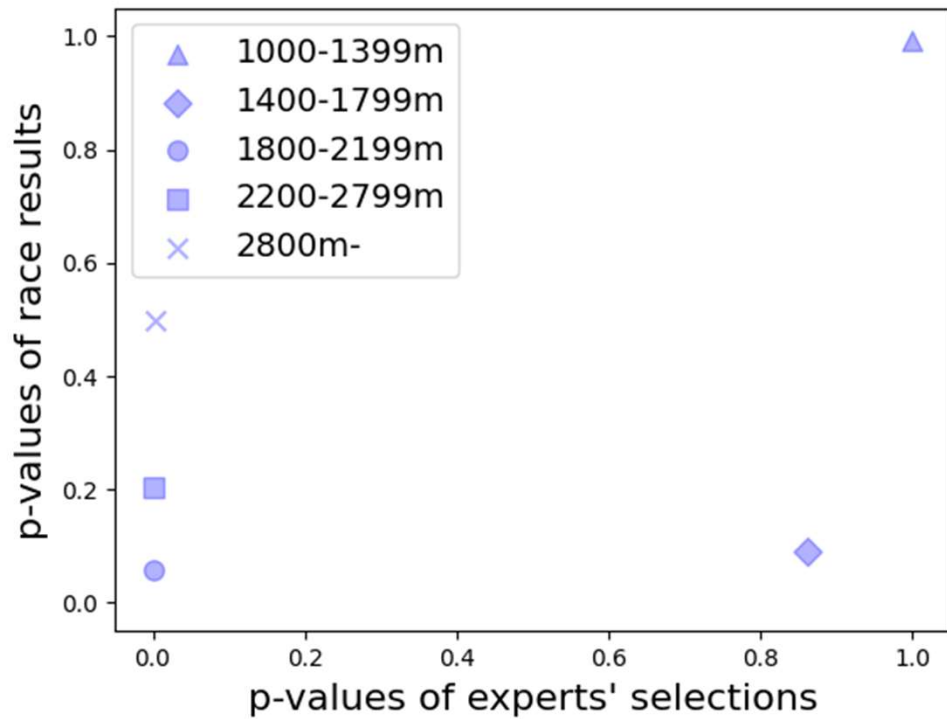
first place



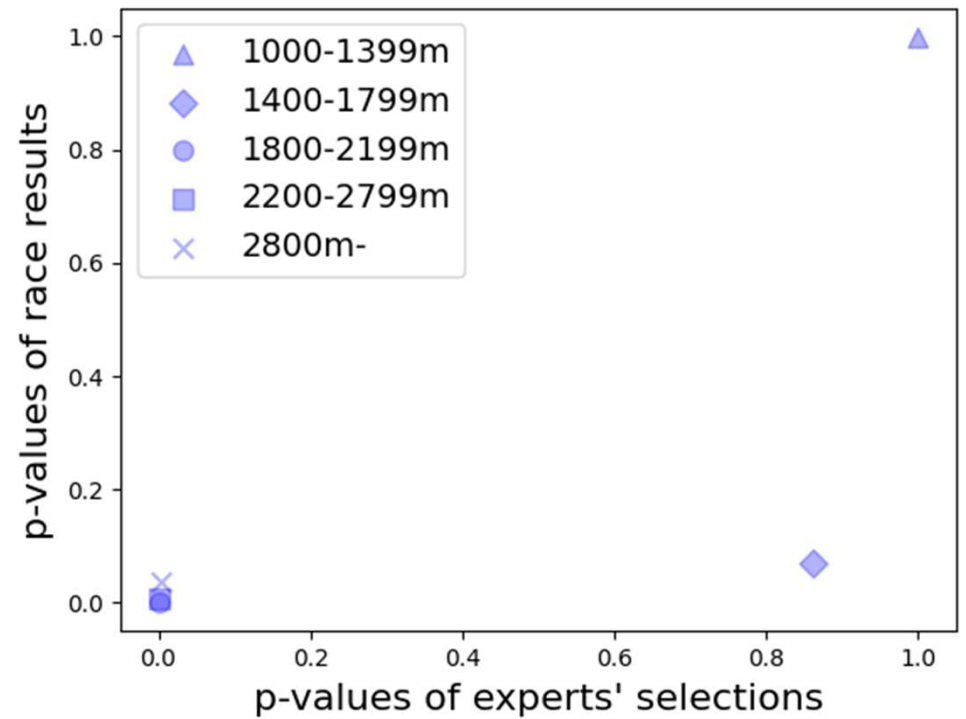
within fifth place

experts' selections vs race results

Nearctic Line



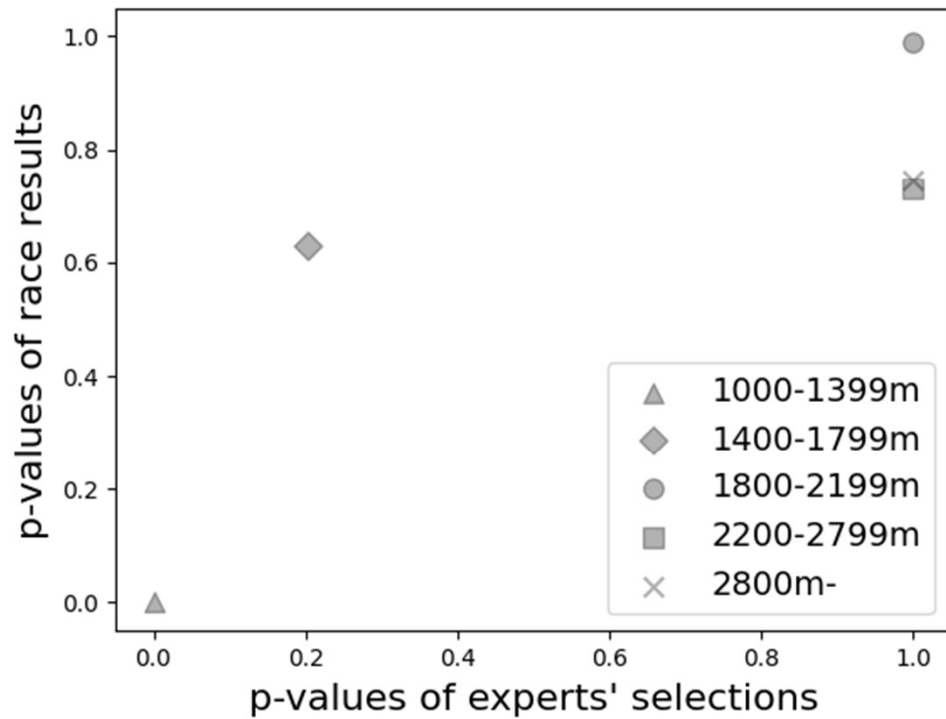
first place



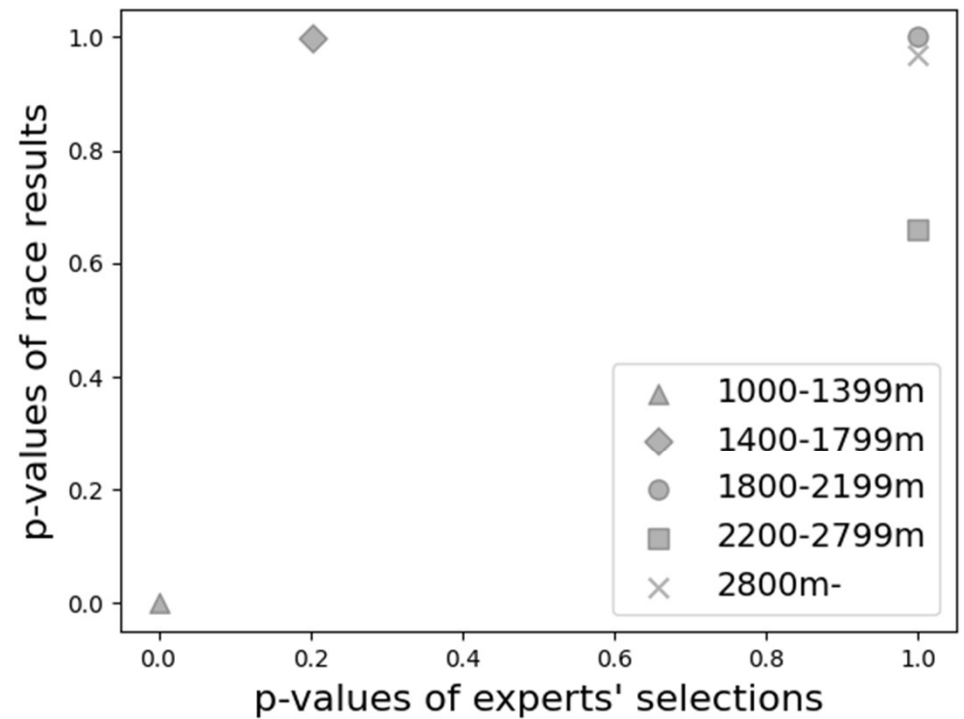
within fifth place

experts' selections vs race results

Royal Charger Line



first place



within fifth place

How to detect cases of experts' poor decisions (1/5)

1. We calculate the p-value of
 - experts' race selections
 - race results

two-sided
binomial test

by applying Hypothesis ES and RR on
15 combinations of

sire lines

Native Dancer Line

Nearctic Line

Royal Charger Line

X

race distances

1000 – 1399m

1400 – 1799m

1800 – 2199m

2200 – 2799m

2800m –

How to detect cases of experts' poor decisions (2/5)

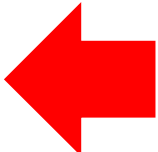
2. By using the p-value of experts' selections (ES), we found

- 5 cases (p-value of ES > 0.975)
experts strongly thought they were favorable to win races
- 7 cases (p-value of ES < 0.025)
experts strongly thought they were unfavorable to win races

two-sided binomial test | significance levels | 0.05

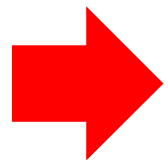
We classified these 12 cases into ...

How to detect cases of experts' poor decisions (3/5)

3. Focused on the difference between the p-values of experts' selections and race results, we classified the 12 cases into
- 8 cases (the difference were **small**)
plotted at the upper right or the lower left of the graphs
 - 2 cases (the difference were **large**) 
plotted at the upper left or the lower right of the graphs
 - 2 other cases

How to detect cases of experts' poor decisions (4/5)

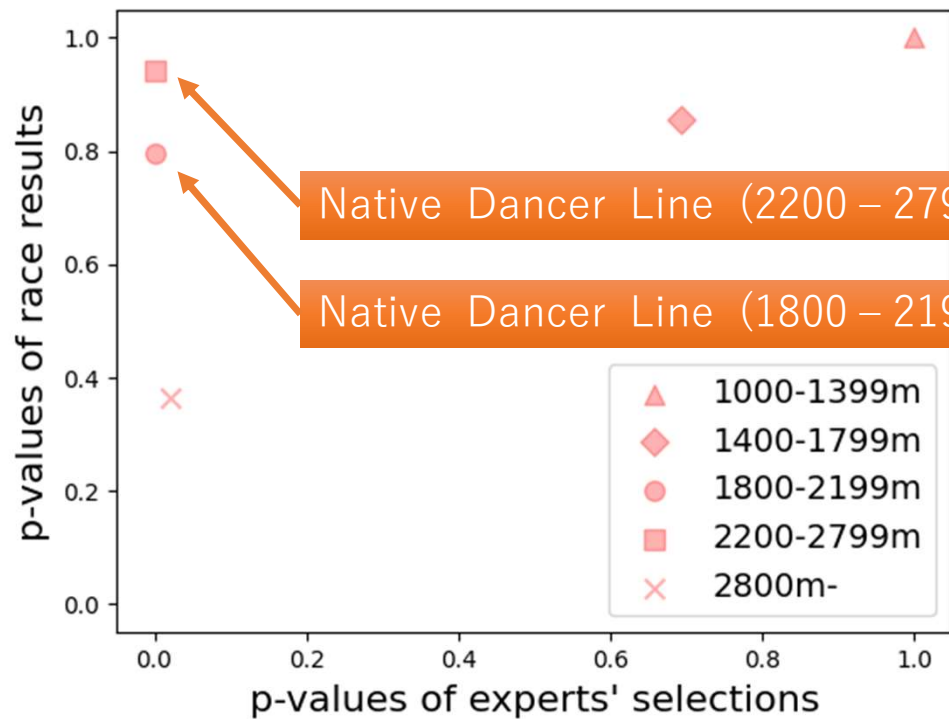
large difference between the p-values of experts' selections and race results



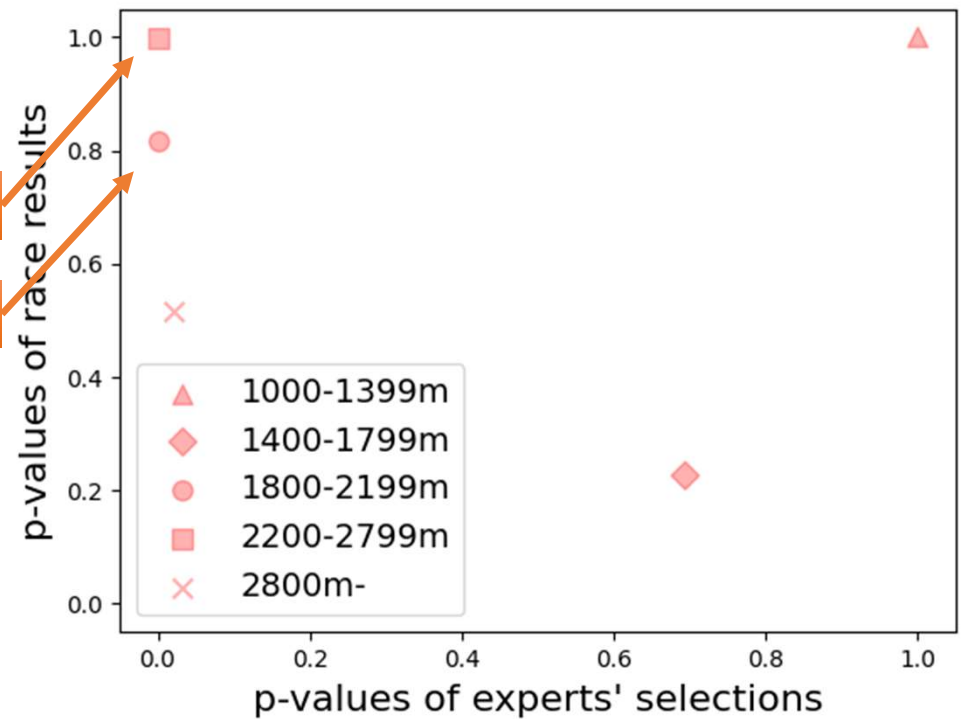
experts' poor decisions

- Native Dancer Line (1800 – 2199m)
- Native Dancer Line (2200 – 2799m)

How to detect cases of experts' poor decisions (5/5)



first place



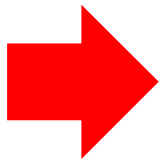
within fifth place

Both cases were plotted at the upper left of the graphs

How horse racing experts make poor decisions (1/2)

Both cases were plotted at the **upper left** of the graphs

- Native Dancer Line (1800 – 2199m)
- Native Dancer Line (2200 – 2799m)



- Experts selected these cases too few times
 - experts strongly thought these cases were **unfavorable to win races**
- The race results showed these cases were **favorable to win races**

How horse racing experts make poor decisions (2/2)

Two ways horse racing experts can make poor decisions on race selections

- experts do not select races that are likely to have good outcomes
- experts select races that are likely to have poor outcomes

which way?
or both ways?



our statistical
analysis

Conclusion

horse racing experts made poor decisions by not selecting races that are likely to have good outcomes

Why horse racing experts make poor decisions? (1/2)

horse racing experts made their poor decisions

- by not selecting races that are likely to have good outcomes
- not by selecting races that are likely to have poor outcomes

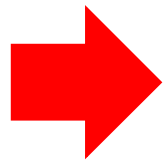
We think it is because

people are more sensitive to risks than opportunities

Why horse racing experts make poor decisions? (2/2)

people are more sensitive to risks than opportunities

- when people lose at something they thought they could win, they carefully consider the consequences
- when people win something they thought they would lose, they, even experts, do not carefully consider the consequences



It is difficult to update knowledge and experiences using good results

Future works

To generalize this finding, we intend to

- analyze race performance data in other countries
- compare the results with those obtained in this study